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WATER SUPPLY OUTLOOK FOR WASHINGTON

and
FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

UNITED STATES DEPARTMENT of AGRICULTURE...SOIL CONSERVATION SERVICE,

and

DEPARTMENT of WATER RESOURCES STATE of WASHINGTON

Data included in this report were obtained by the agencies named above in cooperation with the U.S. Forest Service, U.S. Geological Survey, National Park Service, and other Federal, State and Private organizations.

AS OF
MAY 1, 1969

TO RECIPIENTS OF WATER SUPPLY OUTLOOK REPORTS:

Most of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. Streamflow forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season will interact with a resultant average effect on runoff. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same location near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are about 1400 snow courses in Western United States and in the Columbia Basin in British Columbia. In the near future, it is anticipated that automatic snow water equivalent sensing devices along with radio telemetry will provide a continuous record of snow water equivalent at key locations.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data on reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are also included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

PUBLISHED BY SOIL CONSERVATION SERVICE

The Soil Conservation Service publishes reports following the principal snow survey dates from January 1 through June 1 in cooperation with state water administrators, agricultural experiment stations and others. Copies of the reports for Western United States and all state reports may be obtained from Soil Conservation Service, Western Regional Technical Service Center, Room 209, 701 N. W. Glisan, Portland, Oregon 97209.

Copies of state and local reports may also be obtained from state offices of the Soil Conservation Service in the following states:

STATE	ADDRESS
Alaska	P. O. Box "F", Palmer, Alaska 99645
Arizona	6029 Federal Building, Phoenix, Arizona 85205
Colorado (N. Mex.)	12417 Federal Building, Denver, Colorado 80521
Idaho	P. O. Box 38, Boise, Idaho 83707
Montana	P. O. Box 98, Bozeman, Montana 59715
Nevada	P. O. Box 4850, Reno Nevada 89505
Oregon	1218 S. W. Washington St., Portland, Oregon 97205
Utah	4012 Federal Building, Salt Lake City, Utah 84111
Washington	360 U.S. Court House, Spokane, Washington 99201
Wyoming	P. O. Box 340, Casper, Wyoming 82602

PUBLISHED BY OTHER AGENCIES

Water Supply Outlook reports prepared by other agencies include a report for California by the Water Supply Forecast and Snow Surveys Unit, California Department of Water Resources, P. O. Box 388, Sacramento, California 95802 --- and for British Columbia by the Department of Lands, Forests and Water Resources, Water Resources Service, Parliament Building, Victoria, British Columbia



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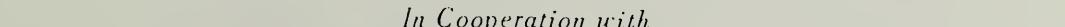
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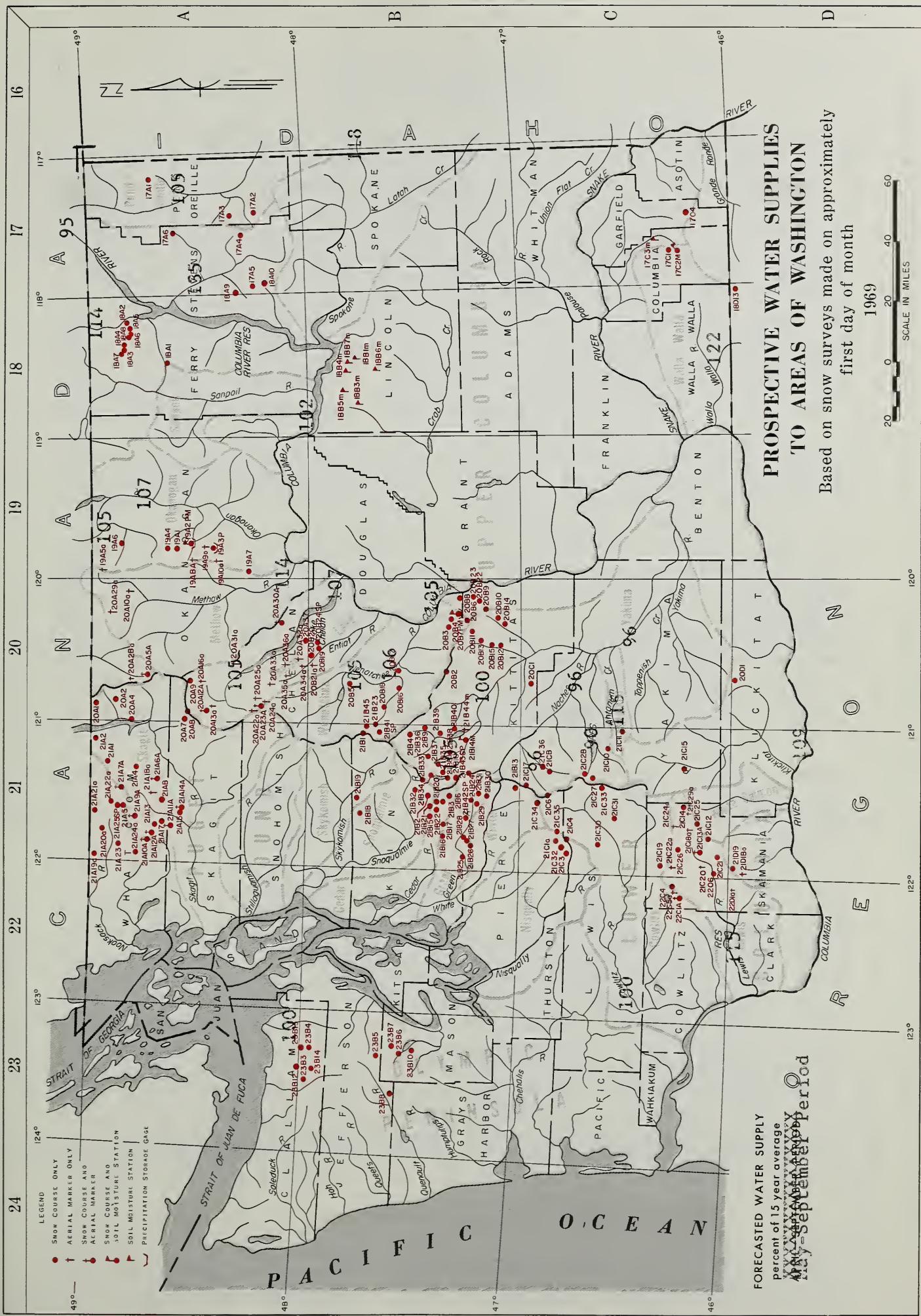
DIRECTOR
DEPARTMENT OF WATER RESOURCES
STATE OF WASHINGTON



Report prepared by

ROBERT T. DAVIS, Snow Survey Supervisor

SOIL CONSERVATION SERVICE
360 U.S. COURTHOUSE
SPOKANE, WASHINGTON 99201



FORECASTED WATER SUPPLY
Percent of 15 year average

Month	Percent of 15 year average
January	~10%
February	~15%
March	~20%
April	~25%
May	~30%
June	~35%
July	~40%
August	~45%
September	~50%
October	~55%
November	~60%
December	~90%

Based on snow surveys made on approximately first day of month

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COLUMBIA

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100 20 0 20 40 60

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190 60

percent of total average

120°

230

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120°

235

INDEX to WASHINGTON SNOW COURSES, SOIL MOISTURE STATIONS, and PRECIPITATION STORAGES GAGES

NAME	NUMBER	SEC.	IMP.	MANUF.	FLV.	NAME	NUMBER	SEC.	IMP.	HANG.	FLV.	NAME	NUMBER	SEC.	IMP.	RANGE	FLV.
UPPER COLUMBIA DRAINAGE																	
Pend Oreille River						Clockum Creek	21A2	11	2 N	2 W	530	Divide Meadow	21C29a	21	ON	1 W	5600
Boyer Mountain	17A2	7	31N	43E	5,500	Clockum Creek N.	21A2	1	2 N	2 E	6,300	Grand Meadow	21C25	28	ON	1 E	3,200
Bunchgrass Meadow	17A1	24	31N	44E	5,000	Squilchuck Creek	20B3	1	21N	19E	4,000	Lone Pine Shelter	21C26	8	ON	1 E	3,500
Winchester Creek	1A3	30	31N	43E	2,920	Benefice Springs	20B4	18	21N	20E	3,000	Marble Mountain	22C26	24	ON	1 E	5,000
Kettle River	18A2	36	31N	36E	14,500	Scout-A-Vista	20B4	18	21N	19E	4,000	New Muddy River	22C26	36	81	6 E	3,500
Boulder Road	1A1	28	31N	35E	4,070	Stemilt Creek	20B8	34	21N	20E	4,650	Oldman Pass	21D19	22	61	7 E	3,000
Butte Creek	1A1	5	31N	36E	1,700	Jump-Crf	20B6	30	21N	20E	5,000	Plain of Abram	22C14	29	93	5 E	2,600
Cabin Creek	1A1	28	31N	35E	3,515	Stemilt Slide	20B7	30	21N	20E	4,400	Smith Creek Road	22C14	20	91	6 E	2,400
Goat Creek	1A1	17	31N	35E	1,740	Upper Wheeler	21A4	35	21N	30E	4,250	Spencer Meadow	21C20a	16	8 N	3,000	2,200
Snow Caps Creek	1A5	3	31N	36E	2,150	Crab Creek	20B7	30	21N	20E	4,400	Surprise Lakes	21C24a	20	9 E	4,500	2,000
Snow Caps Trail	1A6	5	31N	35E	2,270	Creston-Kunz	1A81m	32	27N	34 E	2,420	Table Mountain	21D18a	36	6 N	3,000	1,800
Summit G. S.	1A7	20	31N	35E	4,700	Jack Woods	1A83m	28	27N	31 E	2,750	Timbered Peak	21D18a	36	6 N	3,000	1,600
COLVILLE RIVER																	
Baird	17A2	19	36N	42E	3,215	Sheffrahs	18A2	34	32N	35 E	2,085	Cayuse Pass	21C6	15	16 N	10 E	5,300
Carlson	1A2	11	31N	41E	4,250	Sheppen	17A2	11	32N	35 E	2,085	Mosquitobendos	21C19	33	10 N	7 E	4,100
Chewelah	17A2	20	31N	35E	4,700	Wheatridge	18B7m	24	27N	33 E	2,420	Thompson Pass	21C32	28	15 N	10 E	2,200
Stranger Mountain	17A5	6	29N	35E	3,370	Yakima River	21A10	21	12N	18 E	2,290	Packwood Lake	21C31	21	13 N	10 E	2,400
Togo	1A10	6	29N	35E		Ahtanum R. S.	21C11	26	12 N	14 E	3,100	Pigtail Peak	21C33	11	13 N	11 E	5,700
Sonopai River	1A1	19	36N	35E	5,350	Big Boulder Creek	21B9	35	23N	14 E	3,200	Potato Hill	21C4	36	10 N	5 E	16,000
Sherman Creek Pass	1A1	19	36N	35E		Bumping Lake	21C8	23	16N	12 E	3,500	Willamee Creek	21C30	3	13 N	8 E	3,600
Clark	1A83a	2	36N	23E	7000	Clockum Pass	20B9	25	20N	20 E	4,123	Bald Mountain	21A19n	7	4 N	7 E	4,600
Huckamuck	1A9a	20	36N	24E	6,750	Cooper Pass	21B36	33	23N	13 E	3,300	Canyon Glacier Creek	21A20a	20	4 N	8 E	5,100
Mutton Creek No. 1	1A1	30	37N	24E	5,700	Dorsey Flat	21B4m	15	19N	20 E	4,200	Hannagan Pass	21A23	4	10 N	7 E	3,700
Mutton Creek No. 2	1A4	10	37N	24E	6,000	Fish Lake	21C8	34	24N	14 E	3,371	Mazama Park	21A24a	8	37 N	7 E	5,000
Paysayten Creek	20A28a	32	30N	18E	4,200	Green Lake	21C10	3	12N	13 E	6,000	Panorama	21A5	17	29 N	9 E	4,300
Rusty Creek	1A3P	14	31N	24E	4,500	Grouse Camp	20B10	29	21 N	19 E	5,385	Panorama Snow Pillow	21A5SP	17	31 N	9 E	4,300
Salmon Meadows	1A4P	33	37N	24E	4,500	High Creek	20B12	34	20 N	19 E	2,930	Twin Lakes	21A2a	16	4 N	9 E	5,200
Starvation Mtn.	1A91a	15	35N	23E	6,750	Huyaka Dam	21B34	15	22N	11 E	2,600	Ghost Forest	21C4	23	15 N	8 E	4,550
Touts Coulee	1A46	30	39N	25E	2,845	Kachess Dam	21B38	34	21 N	13 E	2,220	Longmire	21C35	13	15 N	8 E	2,600
Methow River	20A10a	10	38N	20E	64,00	Kachess Peninsula	21B37	32	22N	13 E	2,280	Paradise Park (New)	21C1	13	15 N	8 E	5,050
Billy Goat Pass	20A29a	8	37N	20E	7,000	Lake Cle Elum	21B1M	15	20N	14 E	2,200	Steam Glade	21C36	13	15 N	8 E	5,050
Dollar Watch	20A5A	7	37N	18E	6,500	Morgan Creek	20B1	24	17 N	16 E	3,935	White River	21B3	30	18 N	11 E	6,000
Harts Pass	1A9a	15	40N	23E	7,000	Morse Lake	21C10	6	21N	11 E	5,000	Corral Pass	21B3	37	18 N	11 E	5,000
Horsehoe Basin	1A97	36	34N	23E	4,650	Manum	20B13	4	20 N	19 E	3,875	White River Campground	21C2	4	16 N	9 E	5,000
Loup Loup						Salmon La Sac	21B39	16	22N	14 E	2,340	Deer Park	21B3	13	26 N	5 W	5,200
CHELAN LAKE BASIN																	
Cloudy Pass	20A22a	12	31N	15E	6,500	Snouqualmie Pass	21B33	4	22N	11 E	3,360	Airstrip Creek	21B24	18	20 N	11 E	1:00
Greenwood Flat	20A5a	3	31N	16E	3,940	Tunnel Avenue	20B14	20	19N	20 E	4,250	Charley Creek	21B25	27	21 N	12 E	1:00
Little Meadows	20A24a	8	31N	16E	5,275	Walters Flat	20B15	22	19N	19 E	3,360	Cougar Mountain	21B2SP	21	21 N	9 E	3,200
Lyman Lake	20A23a	18	31N	16E	5,900	White Pass (East Side)	21C28	2	23N	11 E	4,500	Grass Mountain No. 1	21B26	21	20 N	8 E	4,000
Park Creek Flat	20A13a	18	34N	16E	2,220	White Pass (Leach Lake)	21C27	1	23N	11 E	4,500	Grass Mountain No. 2	21B27	14	20 N	8 E	4,000
Park Creek Ridge	20A12a	7	34N	16E	4,600	Lester Creek	21C28	12	20 N	11 E	3,000	Grass Mountain No. 3	21B28	12	20 N	8 E	3,200
Petersons	20A16a	3	34N	17E	3,730	Sawmill Ridge	21B29	36	20 N	10 E	3,100	Lester Creek	21B29	36	10 N	8 E	3,100
Rainy Pass	20A9	21	35N	17E	4,780	Shawnee Butte	21B31	5	19 N	11 E	4,700	Sawmill Ridge	21B31	5	19 N	11 E	5,000
Safety Harbor	20A30a	32	31N	20E	6,500	Stampede Pass	21B30	25	21 N	11 E	3,000	Shawnee Butte Pass	21B30	18	12 N	11 E	3,000
War Creek Pass	20A31a	34	33N	18E	6,500	Twin Camp	21B30	18	12 N	11 E	4,100	Black and White Lakes	23B6	17	24 N	5 W	4,200
LOWER COLUMBIA DRAINAGE																	
Entiat River	20B19	24	28N	19E	1600	Spruce Springs	17C4	9	8 N	42 E	5,700	Four Stream Home	23B5	1	23 N	1 W	3,900
Brief	20A34a	28	31N	17E	4,800	Mill Creek	20B16	2	29N	17 E	5,370	Green River	21B3	10	21 N	10 E	2,390
Entiat Meadows	20A36a	17	30N	18E	6,610	Couse	17C3m	2	9 N	35 E	4,370	City Cabin	21B21	30	22 N	10 E	3,300
For Camp	20B24SP	22	29N	18E	4,300	Homestead	17C1	11	9 N	40 E	4,030	Mt. Gardner Aux.	21B22	31	22 N	10 E	2,500
Pope Ridge	20A32a	24	30N	18E	6,200	Martin Springs (Helmers SM)	17C2M	23	10 N	40 E	4,000	Mt. Lindsay	21B16	31	22 N	9 E	2,500
Pope Ridge Snow Pillow	20A37	20	29N	19E	6,200	Walla Walla Diversions	18D13	22	6 N	38 E	4,200	Mt. Washington	21B15	8	22 N	9 E	3,000
Pugh Ridge	20A35a	21	30N	17E	3,850	Klickitat River	20D1	21	22 N	17 E	4,030	Rex River	21B17	11	21 N	9 E	2,400
Snow Brushy	20B21a	10	28N	18E	5,330	Status Pass	20D1	21	6 N	17 E	4,030	South Fork Cedar	21B6	24	21 N	10 E	3,000
Tommy Creek						West Fork Cabin	21C15	23	9 N	12 E	2,000	Tinkham Creek	21B20	1	21 N	10 E	3,400
WENATCHEE RIVER																	
Berne-Mill Creek	21B23	7	26N	15E	2,925	White Salmon River	21C12	35	7 N	8 E	4,000	Snoqualmie River	21B32	16	22 N	10 E	1,635
Berne-Mill Creek (New)	21B1SP	13	26N	14E	3,240	Cultus Creek	4270	25	25 N	17 E	4,270	Bander Air Strip	21B2	19	22 N	11 E	3,625
Blewett Pass No. 2	20B2	35	22N	17E	4,270	Lewis River	1810	18	25 N	17 E	4,270	Ollalie Meadow	21B18	26	26 N	9 E	1,900
Chiwukum G. S.	20B16	4	25N	17E	1,810	Blue Lake	1127	1	24 N	17 E	1,810	South Fork Tolt	21B15	8	22 N	9 E	5,200
Lake Wenatchee	20B5	33	22N	17E	1,970	Bob's Trail	21C21	2	24 N	16 E	2,140	Leavenworth R. S.	20B17	4	26 N	11 E	2,600
Nerritt Pass	20B18	1	24 N	17 E	1,127	Blue Lake	21C22a	19	9 N	8 E	4,200	Stevens Pass Sand Shed	21B18a	24	9 N	9 E	2,400
Stevens Pass	21B1	14	26 N	13E	4,270	White Salmon River	21C21	2	24 N	16 E	4,270	South Fork Cabin	21B18	12	26 N	10 E	2,900
Stevens Pass Sand Shed	21B45	12	26 N	19E	3,700	Klickitat River	21C18a	24	9 N	9 E	4,200	Thunder Basin	20A7	15	25 N	14 E	2,400

LEGEND

- SNOW COURSE ONLY
- 21A7 AERIAL MARKER
- 21A7 SNOW COURSE AND AERIAL MARKER
- 21A7 SNOW COURSE AND SOIL MOISTURE STATION
- 21A7 SOIL MOISTURE STATION
- 21A7 SNOW COURSE AND PRECIPITATION STORAGE GAGE
- 21A7 PRECIPITATION STORAGE GAGE
- 21A7 SNOW PILLOW

NUMBERING SYSTEM EXAMPLE

21A7 SNOW COURSE ONLY

WATER SUPPLY OUTLOOK State of Washington

May 1, 1969

*
* Precipitation and runoff are the key factors that have occurred dur-
* ing the month of April. The rivers of the State have flowed well
* above normal except for the Similkameen, Cowlitz and Chehalis. Pre-
* cipitation was well above normal except for the central area and the
* southwest slopes of the Cascades. These high flows have caused a
* general reduction in the water supply forecasts and the above normal
* precipitation tried to increase the amount of water yet to come from
* the watersheds. The result of these two opposing conditions was
* very little change within the State. In some instances the precipi-
* tation outweighed the runoff and forecasts went up percentagewise
* and in other instances the reverse was true.

* At the present time the outlook for water supply can still be considered very good for all areas within the State and from tributary basins flowing into Washington. Snowpack, as a factor in forecasting, is not as strong on the first of May as in previous months because it is generally on the decrease. Only a few high elevation snow courses, such as Harts Pass, Jasper Pass, and Easy Pass, increased their water equivalent over that which was measured last month. This normal increase occurred this year as did a generally normal decrease on most other snow courses. Our warm days, the cause of our high flows, has taken off the snowpack at the lower elevations and many of the mid-range snow courses were depleted slightly more than average. This warm temperature affected the higher elevation snow courses also but not to the extent as reported above.

* Last month the densities were reported to be abnormally high --similar to May of normal years. This month the densities have not changed from that which was reported last month to any extent. The ripeness of the snow last month was stable with very little change. Of course, snow can only get so dense before melting occurs and it runs off. The watersheds, taken individually, and comparing the snowpacks to last year, indicate the Yakima 468% greater than last year down to the Okanogan which has a snowpack that is now 3% less. Comparing the watersheds to normal, the Walla Walla watershed, previously reported extremely high, now has a snowpack that is 21% below normal. The high area in the State is the Lewis, with a snowpack that is 45% greater than normal. The interesting snow covers in the Green and Cedar watersheds are not measured on the first of May but the conditions are that these extensive low-elevation snowpacks have run off. Although the runoff has been very high, flooding has been very minor and nothing compared to what could have occurred under adverse weather conditions of warm days, warm nights, and warm rains.

SNOW COVER

The heavy snow covers reported last month have all been substantially decreased. The low-elevation snow cover which made up the high portion of the percentage figures has run off leaving near normal amounts of

water in the mountains for later spring runoff. A few classic examples are the reduction of the Walla Walla River from 69% above normal to 21% below and the reduction of the Kettle watershed from 62% above normal to normal. This comparison is not a true evaluation of snow cover from April 1 to May 1 because so many more snow courses at all elevations are measured on April 1 than are measured as of May 1. We know what the maximum snow cover over the State was and now we are watching how it depletes. This can be done with fewer snow courses and those at higher elevations.

RESERVOIRS

Generally speaking, the reservoirs are in better shape than they are normally for this time of year and all are expected to fill with the spring runoff. The power reservoirs on the main stem and tributaries have above normal amounts of water in storage and this is a result of early filling to maintain the low water elevation in FDR Lake. Construction at the third power house should permit the reservoir to start filling about the middle of May and filling will take place in an orderly manner with storage maintained for later flood control purposes. Irrigation reservoirs have near normal amounts of water in storage with the Yakima reservoir holding 802,700 acre-feet. Coeur d'Alene Lake has its usual above capacity storage.

PRECIPITATION

The precipitation as reported by stations in Washington and British Columbia had a wide range--from 39% to 439% of normal. All of the upper Columbia in Canada had well above normal precipitation during the month --as high as the aforementioned 439%. The low area within the basin occurred in the central portion of Washington on the Yakima, Wenatchee and Chelan watersheds. One other low area was on the southwest slopes of the Cascades with the northwest slopes having a normal amount of rainfall. All other areas had well above normal precipitation during the month of April.

SOIL MOISTURE

As can be expected the soil mantle continues to wet up with the melting of the snowpacks. The soil moisture conditions as of the first of May are not as critical to water supply forecasts as earlier measurements. The voids in the soil mantle have been accounted for in the earlier forecasts and are now in the process of filling up from the melting snow.

STREAMFLOW

As stated above, streamflow during the month of April was generally excessive in all areas. The high in the State occurred on the Palouse with a 138% above normal runoff and the low occurred on the Similkameen with a 13% below normal runoff. The main stem had well above normal flows with Birchbank 76% above and The Dalles 66% above. There is a good correlation between the amount of runoff during April and the depletion of the snowpack during the month.

STREAMFLOW FORECAST - MAY 1969

The following summarized runoff forecasts are based principally on mountain snow cover and on the assumption that precipitation and temperature will be near average from the present time to the end of the forecast period. Appreciable deviations from normal of temperature and/or precipitation will correspondingly modify these forecasts.

Streamflow figures for 1968 are preliminary and subject to revision.

Basin, Stream and Station	Forecast Runoff 1969	Seasonal Streamflow in Thousands of Acre-Feet						15-Yr. Avg. 1953-67		
		% 15-Yr. Avg.	Fore- cast Period	Measured Runoff 1968	1967	1966				
<u>COLUMBIA BASIN</u>										
<u>Columbia River System</u>										
<u>Columbia River</u>										
at Birchbank 1/	41400	95	May-Sep	44610	49836	42575	43582			
	33700	97	May-Jul	33280	39220	32820	34697			
	24000	99	May-Jun	20850	25570	21876	24256			
<u>Columbia River</u>										
at Grand Coulee 1/	64000	102	May-Sep	58640	69381	55829	62792			
	53800	103	May-Jul	45520	57806	45027	52234			
	40800	104	May-Jun	31450	41585	32163	39224			
<u>Columbia River</u>										
bl. Rock Island Dam 1/	72400	105	May-Sep	64570	76486	60694	68997			
	60950	106	May-Jul	50660	64275	49296	57502			
	46600	108	May-Jun	35130	46812	35478	43113			
<u>Columbia River</u>										
at The Dalles, Ore. 1/	10000	109	May-Sep	80470	100620	75010	92457			
	85000	110	May-Jul	62870	84881	60348	77330			
	66300	111	May-Jun	45350	63145	44552	59688			
<u>Pend Oreille River System</u>										
<u>Pend Oreille River</u>										
bl. Box Canyon	14600	105	May-Sep	11600	15193	11358	13862			
	13400	106	May-Jul	9720	14288	10380	12642			
	11400	107	May-Jun	8100	12063	8656	10618			
<u>Kettle River System</u>										
<u>Kettle River</u>										
nr. Laurier	1910	114	May-Sep	1702	1753	1184	1667			
	1810	115	May-Jul	1567	1720	1131	1571			
	1620	116	May-Jun	1406	1580	976	1393			

1/ Observed flow corrected for storage in any of the following reservoirs which are above the station: Kootenay Lake, Hungry Horse, Flathead Lake, Pend Oreille Lake, F. D. Roosevelt Lake, Lake Chelan, Coeur d'Alene Lake, Brownlee, Noxon Reservoir and pumpage at F. D. Roosevelt Lake.

*** Forecasts made by Water Investigations Branch, Water Resources Service, Department of Lands, Forests, and Water Resources.

Streamflow Forecasts - May 1969 (Cont.)

Basin, Stream and Station	Forecast Runoff 1969	% Avg.	Seasonal Streamflow in Thousands of Acre-Feet			15-Yr. Avg. 1953-67
			15-Yr. Avg.	Fore- cast Period	Measured Runoff 1968 1967 1966	

Kettle River System (Cont.)

Colville River

at Kettle Falls	132	135	May-Sep		86	43	98
	117	136	May-Jul		80	36	86
	104	137	May-Jun		73	31	76

Spokane River System *

Spokane River

at Post Falls, Ida. <u>2/</u>	2500	118	May-Sep		2226	1560	2110
	2380	118	May-Jul		2166	1504	2015
	2200	118	May-Jun		2033	1412	1872

Okanogan River System **

Similkameen River

nr. Nighthawk	1500	105	May-Sep	1307	1641	866	1431
	1400	106	May-Jul	1222	1571	803	1325
	1180	107	May-Jun	1028	1360	663	1103

Okanogan River

nr. Tonasket	1720	107	May-Sep	1486	1736	909	1609
	1560	108	May-Jul	1348	1654	821	1449
	1300	109	May-Jun	1117	1426	667	1190

Methow River System **

Methow River

nr. Pateros	1100	114	May-Sep	899	1217	582	969
	1020	114	May-Jul	833	1159	531	895
	860	115	May-Jun	790	995	436	748

Chelan River System

Chelan River

at Chelan <u>4/</u>	1230	107	May-Sep	1150	1310	860	1148
	1080	108	May-Jul	996	1175	747	1001
	820	109	May-Jun	725	910	559	752

* Forecasts made by Morlan W. Nelson and J. Alden Wilson, Soil Conservation Service, Boise, Idaho.

** These forecasts are based in part upon base flow data especially prepared and furnished for this purpose by the U. S. Geological Survey.

2/ Observed flow corrected for storage in Coeur d'Alene Lake and diversions by Spokane Valley Farms Company and Rathdrum Prairie Canals.

4/ Observed flow corrected for storage in Lake Chelan.

Streamflow Forecasts - May 1969 (Cont.)

Basin, Stream and Station	Forecast Runoff 1969	Seasonal Streamflow in Thousands of Acre-Feet					15-Yr. Avg. 1953-67
		% Avg.	15-Yr. Avg.	Fore- cast Period	Measured Runoff 1968	Runoff 1967	
<u>Chelan River System (Cont.)</u>							
Stehokin River at Stehokin	870	105		May-Sep	970	653	827
	740	106		May-Jul	834	543	695
	550	108		May-Jun	639	399	509
<u>Wenatchee River System</u>							
Wenatchee River at Plain	1240	105		May-Sep	1253	913	1183
	1120	106		May-Jul	1142	822	1053
	870	108		May-Jun	884	638	802
Wenatchee River at Peshastin	1700	106		May-Sep	1384	1703	1250
	1560	108		May-Jul	1203	1567	1136
	1220	110		May-Jun	932	1232	888
Ste milt Basin nr. Wenatchee	130*			May-Sep	146*	132*	--
<u>Yakima River System</u>							
Yakima River nr. Martin 5/	124	105		May-Sep	80	105	94
	113	106		May-Jul	63	102	90
	94	117		May-Jun	56	91	78
Yakima River at Cle Elum 6/	790	100		May-Sep	792	648	790
	720	102		May-Jul	726	581	707
	610	104		May-Jun	619	494	584
Yakima River nr. Parker	1280	96		May-Sep	1382	959	1339
	1280	97		May-Jul	1422	975	1319
	1150	98		May-Jun	1318	877	1174
Kachess River nr. Easton 8/	107	105		May-Sep	61	91	77
	101	106		May-Jul	52	89	76
	87	107		May-Jun	47	80	68
							81

* Thousands of Miners' Inches.

5/ Observed flow corrected for storage in Lake Keechelus.

6/ Observed flow corrected for storage in Keechelus, Kachess and Cle Elum Lakes and diversion by Kittitas Canal.

7/ Observed flow corrected for storage in Keechelus, Kachess, Cle Elum, Bumping and Rimrock Lakes and diversions by Roza, Union Gap, New Reservation, Old Reservation and Sunnyside Canals.

8/ Observed flow corrected for storage in Lake Kachess.

Streamflow Forecasts - May 1969 (Cont.)

Basin, Stream and Station	Forecast Runoff 1969	Seasonal Streamflow in Thousands of Acre-Feet					15-Yr. Avg. 1953-67		
		% Avg.	15-Yr. Period	Fore- cast	Measured Runoff 1968	Runoff 1967			
<u>Yakima River System (Cont.)</u>									
Cle Elum River									
nr. Roslyn 9/	415	100	May-Sep	320	406	329	415		
	380	101	May-Jul	272	380	306	375		
	310	102	May-Jun	226	322	254	303		
Bumping River									
nr. Nile 10/	128	96	May-Sep	95	138	105	133		
	117	97	May-Jul	82	130	96	121		
	95	98	May-Jun	72	108	82	97		
American River									
nr. Nile	108	96	May-Sep		120	94	112		
	100	97	May-Jul		112	87	103		
	81	98	May-Jun		92	72	83		
Tieton River									
at Tieton Dam 11/	195	90	May-Sep	157	225	162	216		
	165	91	May-Jul	120	195	142	181		
	127	92	May-Jun	93	154	113	138		
Naches River									
nr. Naches 12/	720	96	May-Sep		809	604	748		
	650	97	May-Jul		743	543	668		
	540	99	May-Jun		628	456	547		
Ahtanum Greeks									
nr. Tampico 13/	46	115	May-Sep		51	30	40		
	41	116	May-Jul		47	26	35		
	35	117	May-Jun		40	22	30		
<u>Lower Columbia River System</u>									
Mill Creek									
nr. Walla Walla	22	122	May-Sep		16	13	18		
	17	121	May-Jul		13	10	14		
	15	125	May-Jun		12	8	12		
Lewis River									
at Ariel 14/	1100	115	May-Sep		856	934	956		
	915	115	May-Jul		743	798	796		
	760	116	May-Jun		638	644	657		
Cowlitz River									
at Castle Rock 15/	2110	100	May-Sep		2115	1933	2120		
	1810	101	May-Jul		1853	1663	1789		
	1450	102	May-Jun		1528	1299	1426		

9/ Observed flow corrected for storage in Lake Cle Elum

10/ Observed flow corrected for storage in Bumping Lake.

11/ Observed flow corrected for storage in Rimrock Lake.

12/ Observed flow corrected for storage in Bumping and Rimrock Lakes and diversions by Tieton, Selah Valley, Wapatox Canals and City of Yakima.

13/ Observed flow of North and South Forks (combined).

14/ Observed flow corrected for storage in Lake Merwin, Yale and Swift Reservoirs.

15/ Observed flow corrected for storage in Mayfield Reservoir.

Streamflow Forecasts - May 1969 (Cont.)

Basin, Stream and Station	Forecast Runoff 1969	Seasonal Streamflow in Thousands of Acre-Feet					15-Yr. Avg. 1953-67	
		% Avg.	Fore- cast Period	Measured Runoff				
		15-Yr. Avg.	1968	1967	1966			

OLYMPIC PENINSULA

Dungeness River System

Dungeness River

nr. Sequim	153	100	May-Sep	191	149	153
	123	101	May-Jul	156	118	122
	89	103	May-Jun	111	81	86

RESERVOIR STORAGE - 1000 Acre Feet

BASIN or STREAM	RESERVOIR	USABLE CAPACITY	1969	Measured 1968	(May) 1967	Normal*
<u>COLUMBIA</u>						
Spokane	Coeur d'Alene Lake	225.1	441.8	127.0	172.0	299.9
Columbia	Franklin D. Roosevelt Lake	5232.0	-1864.1	-284.2	899.1	2444.9
Columbia	Banks Lake	761.8	581.3	464.3	446.8	409.7
Okanogan	Conconully Reservoir	13.0	6.6	7.4	4.7	7.6
Okanogan	Salmon Lake	10.5	7.6	9.0	3.7	8.7
Chelan	Lake Chelan	676.1	229.1	449.6	42.1	210.0
<u>YAKIMA</u>						
Yakima	Keechelus Lake	157.8	107.9	141.4	109.6	120.6
Kachess	Kachess Lake	239.0	193.0	215.9	181.3	202.4
Cle Elum	Lake Cle Elum	436.9	323.4	385.3	280.2	323.2
Bumping	Bumping Lake	33.7	7.7	15.7	4.6	20.1
Tieton	Rimrock Lake	198.0	165.6	165.0	139.2	154.1
<u>PUGET SOUND</u>						
Skagit	Ross Reservoir	1202.9	546.5	993.0	732.7	695.4
Skagit	Diablo Reservoir	90.6	87.0	88.3	82.7	85.2
Skagit	Gorge Reservoir	9.8	8.0	8.8	8.2	--

1/ Based on Active Storage

* 15-year average 1953-67

SOIL MOISTURE - MAY

Drainage Basin and Station	Number	Elev.	Profile	(Inches) :	Soil Moisture Content		
			Depth	Total : Capacity : 1969	(Inches)	as of May 1)	
<u>CRAB CREEK</u>							
Creston-Kunz	18B1m	2440	48	13.6	11.4	7.0	10.8
Jack Woods	18B3m	2600	48	13.6	10.3	9.6	9.6
Krause	18B4m	2440	48	13.6	9.4	8.7	9.1
Sheffels	18B5m	2360	48	13.6	8.3	7.3	8.1
Sherman	18B7m	2440	48	13.6	8.6	8.6	8.1
Wheatridge	18B6m	2200	48	13.6	9.5	8.6	9.2
<u>OKANOGAN</u>							
Salmon Meadows	19A2M	4500	48	5.4	3.7	4.2	3.7
Trout Creek	3-M	3600	48	7.3	Late Report	6.3	5.4
<u>YAKIMA</u>							
Domery Flat	21B20m	2200	48	6.9	Late Report	4.9	4.9
Lake Cle Elum	21B14M	2200	48	12.8	Late Report	9.2	9.1
<u>WALLA WALLA</u>							
Couse	17C3m	3650	48	11.1	10.9	7.2	10.5
Helmers	17C2M	4400	48	12.0	11.2	11.3	11.3
<u>WENATCHEE</u>							
Upper Wheeler	20B7M	4400	48	12.7	Late Report	10.9	11.8

FALL SOIL MOISTURE

Drainage Basin and Station	Number	Elev.	Profile	(Inches) :	Soil Moisture Content		
			Depth	Total : Capacity : 1968	(Inches)	as of Oct. 1	
<u>CRAB CREEK</u>							
Creston-Kunz	18B1m	2440	48	13.6	5.0	4.6	5.0
Jack Woods	18B3m	2600	48	13.6	7.1	5.2	4.3
Krause	18B4m	2440	48	13.6	5.2	4.9	5.1
Sheffels	18B5m	2360	48	13.6	4.9	3.7	3.8
Sherman	18B7m	2440	48	13.6	3.9	3.6	3.7
Wheatridge	18B6m	2200	48	13.6	4.6	4.0	4.1
<u>OKANOGAN</u>							
Salmon Meadows	19A2M	4500	48	5.4	2.7	1.5	3.0
Trout Creek	3-M	3600	48	7.3	4.1	4.0	3.8
<u>YAKIMA</u>							
Domery Flat	21B20m	2200	48	6.9	3.1	4.8	2.4
Lake Cle Elum	21B14M	2200	48	12.8	5.2	9.1	6.4
<u>WALLA WALLA</u>							
Couse	17C3m	3650	48	11.1	7.4	5.4	5.7
Helmers	17C2M	4400	48	12.0	7.6	6.7	6.7
<u>WENATCHEE</u>							
Upper Wheeler	20B7M	4400	48	12.7	5.5	5.6	5.7



PRECIPITATION 1/

Division Averages and Departures

DRAINAGE DIVISIONS	Sept-Oct 1968 <u>2/</u>		WINTER Nov. '68 - Mar. '69 <u>2/</u>		SPRING April '68 <u>2/</u>	
	Observed-	Departure	Observed -	Departure	Observed-	Departure
Columbia in Canada	4.82	+0.93	11.49	-1.20	2.71	+1.33
Pend Oreille - Spokane	7.55	+3.67	20.07	+1.82	2.88	+0.55
Northeastern Washington	3.86	+1.49	12.35	+1.26	2.62	+1.19
Southeastern Washington	5.18	+2.53	14.33	+1.92	3.48	+1.60
Central Washington	4.78	+0.34	29.88	+2.75	1.75	-0.46
North Central Washington	1.05	-0.36	7.90	+1.56	2.05	+1.28
Northwest Slope Cascades	13.60	+1.93	47.27	-4.87	5.98	+0.07
Southwest Slope Cascades	10.97	+3.25	38.79	-2.08	3.98	-0.35

Northeastern Washington

- Lower Spokane, Colville, Sanpoil and lower Kettle drainages.

Southeastern Washington

- Touchet, Tucannon and Palouse drainages.

Central Washington

- Yakima, Wenatchee and Chelan drainages.

North Central Washington

- Methow and Okanogan drainages.

Northwest Slope Cascades

- Puget Sound drainages.

Southwest Slope Cascades

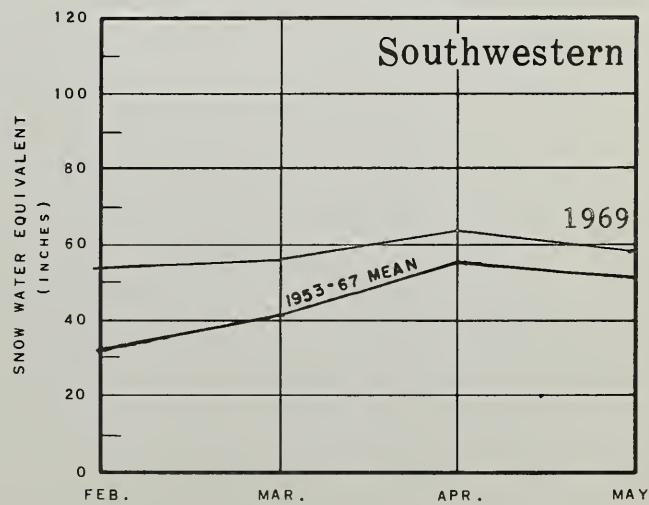
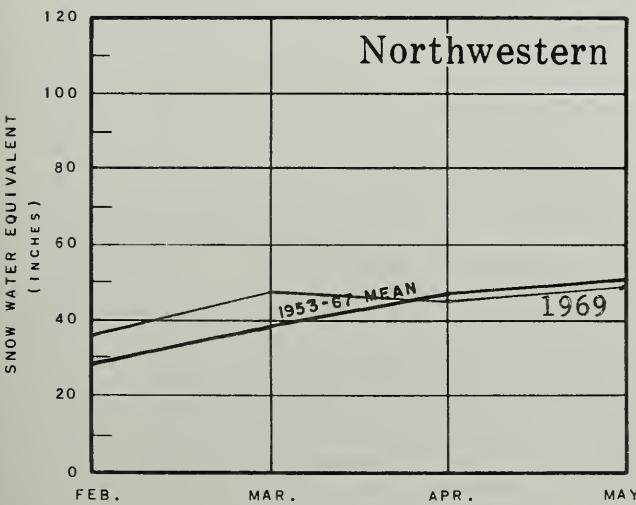
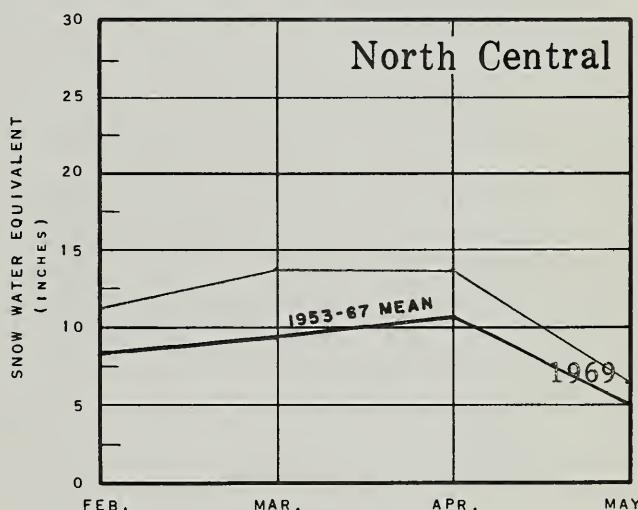
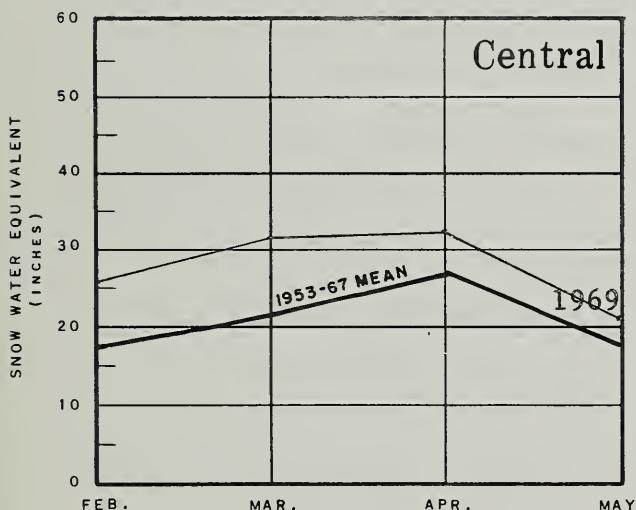
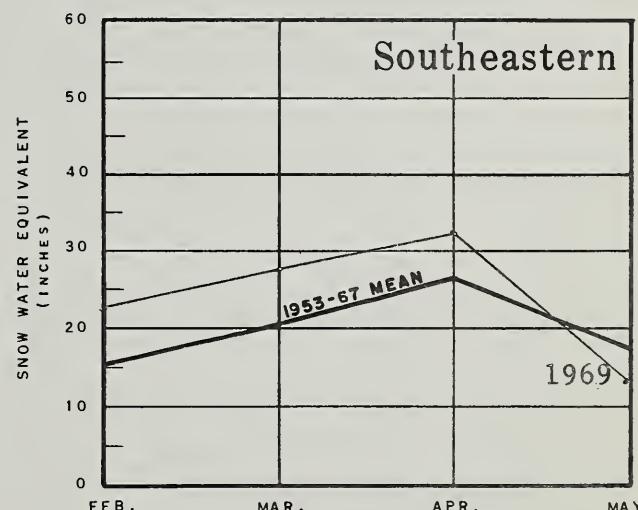
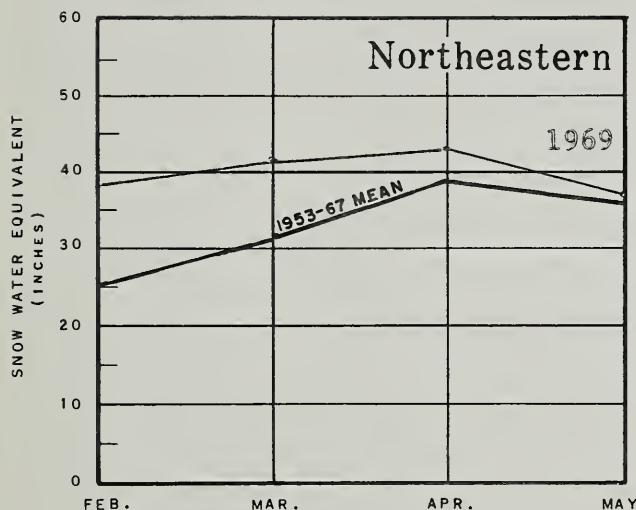
- Lower Columbia drainages.

1/ - Preliminary analysis by U. S. Weather Bureau from data furnished by Meteorological Services of Canada and U. S. Weather Bureau.2/ - Departure from 15-year (1953-67) drainage division average

WASHINGTON SNOW COVER

1969

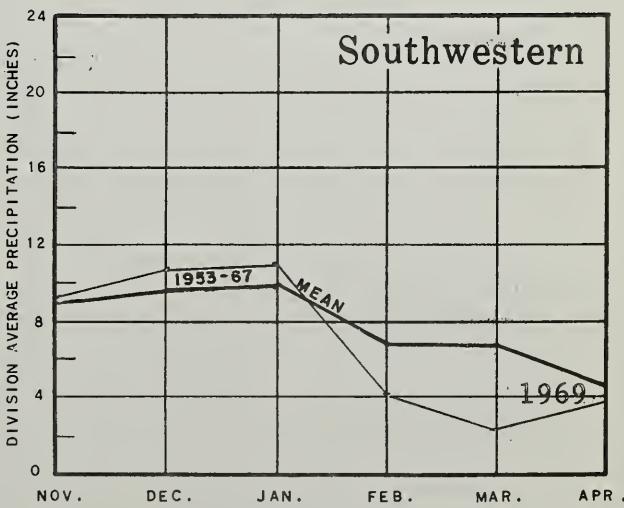
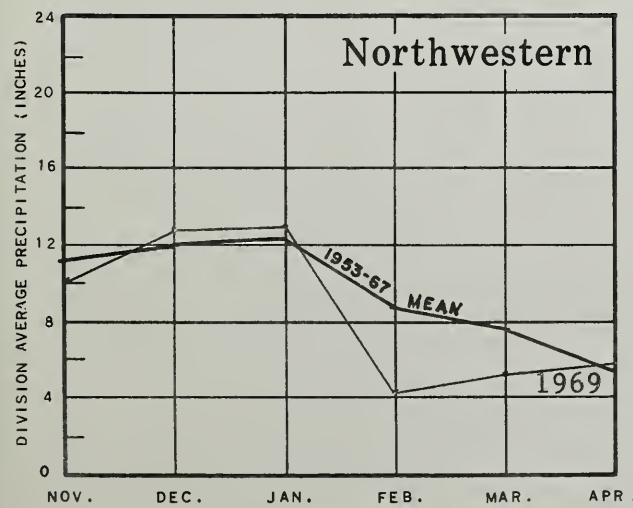
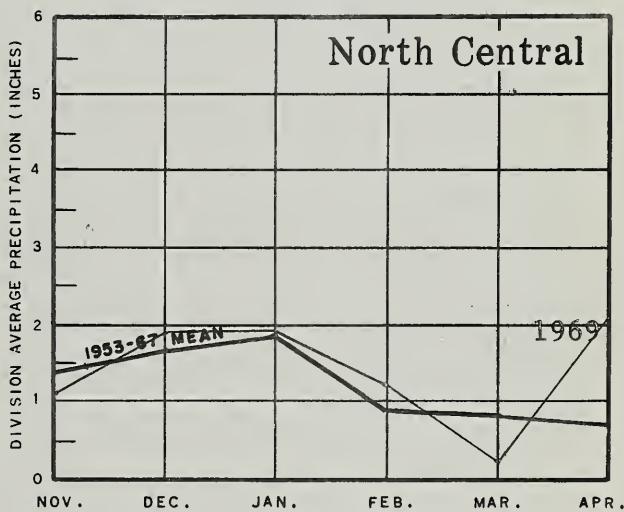
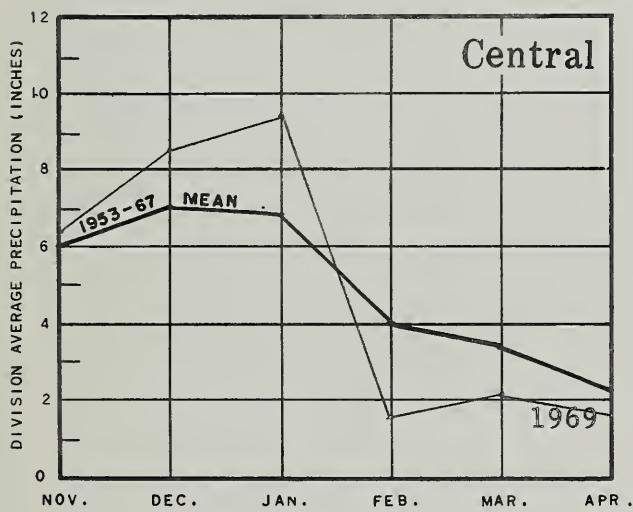
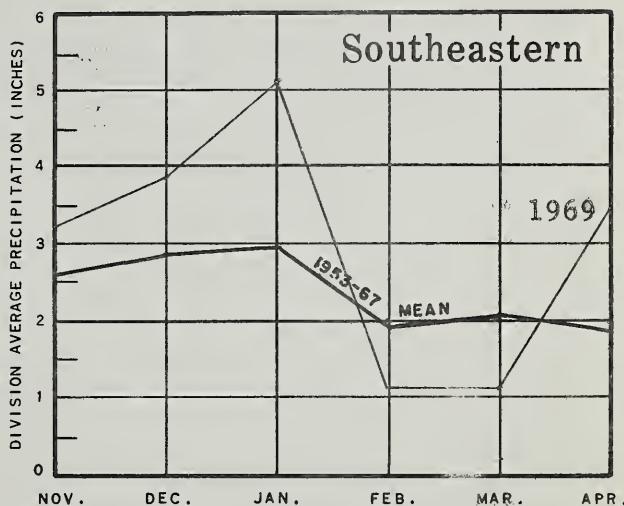
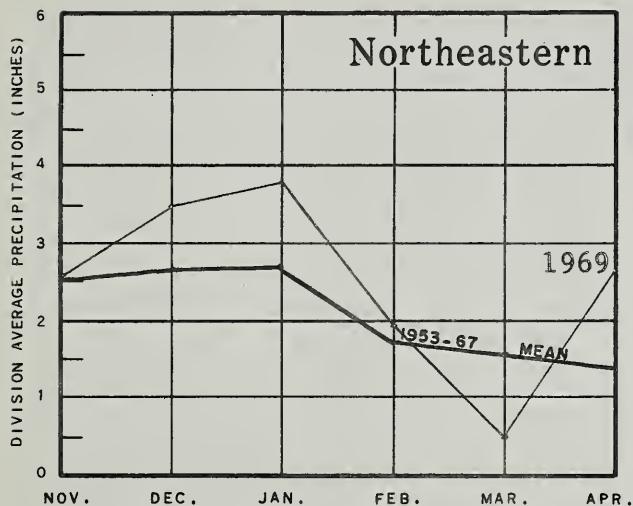
DRAINAGE AREAS



WASHINGTON VALLEY PRECIPITATION

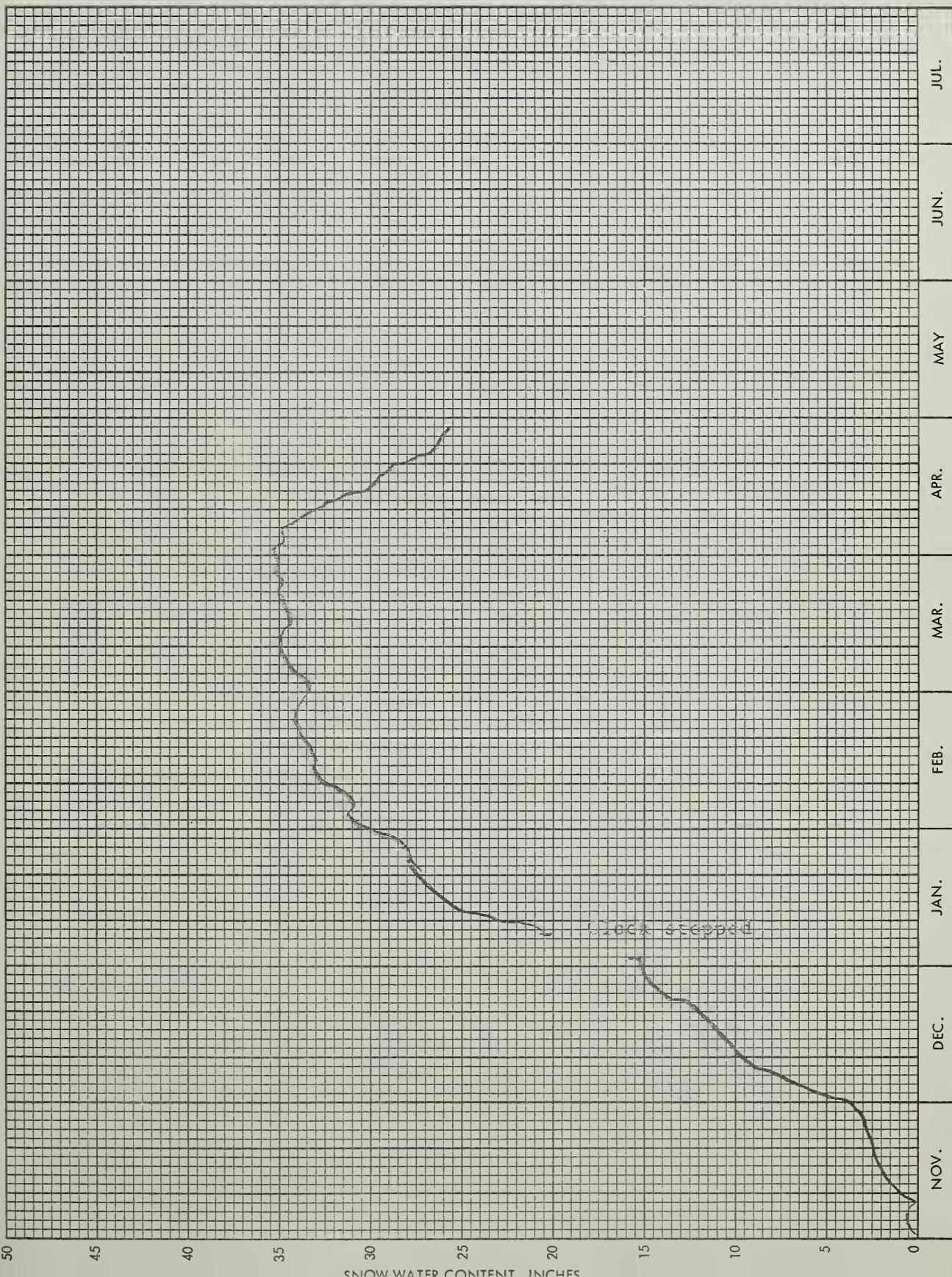
1968 - 1969

DRAINAGE AREAS



SNOW PILLOW DATA

Sec. 13 T. 26N R. 14E No. 21541SP Drainage: Wenatchee
 Lat. 47° 46' Long. 121° 01' Elev. 3170





APPENDIX 1
SNOW DATA APRIL 1 to MAY 1, 1969

SNOW

DRAINAGE BASIN and SNOW COURSE			1969			PAST RECORD		
Name	No.	Elev.	Date of Survey	Snow Depth (in.)	Water Content (in.)	1968	1967	1953-67 Avg.

U P P E R C O L U M B I A D R A I N A G E

PEND OREILLE RIVER

Baree Creek	15B11	5500	5/2	96	40.2	40.4	62.6	49.1
Baree Midway	15B16	4600	5/2	66	32.9	27.7	39.0	--
Benton Meadow	16A2	2344	5/1	0	0.0	0.0	0.0	0.0
Benton Spring	16A3	4900	4/29	37	16.2	11.8	22.9	17.1
Boyer Mountain	17A2	5250	4/28	53	26.8	23.8	27.4	25.2
Brush Creek	14A4	5000	4/29	16	16.6	8.3	15.0	10.8
Bunchgrass Meadow	17A1	5000	4/28	62	32.1	26.0	43.4	30.4
Hoodoo Creek	15C1	6200	5/1	103	51.2	43.0	57.6	52.0*
Lookout	15B2	5250	4/16	88	42.9	31.0	41.9	--
			5/1	79	37.4	28.2	42.4	36.7
Mosquito Ridge	16A4A	5100	Not Measured			--	--	39.2*
Nelson	Canada	3050	4/30	14	5.8	6.0	9.0	6.0**
Schweitzer Bowl	16A6	4500	4/30	61	25.2	27.7	39.3	--
Schweitzer Ridge	16A5	6100	4/30	150	67.0	41.0	57.7	--
Smith Creek	16A1	4800	4/30	96	46.7	43.8	49.3	49.4
Winchester Creek	17A3	2970	4/29	11	4.1	0.0	0.0	0.5*

KETTLE RIVER

Barnes Creek	Canada	5500	5/4	44	17.1	26.1	26.4	21.1**
Big White Mountain	Canada	5500	4/29	54	19.6	20.2	27.2	--
Boulder Road	18A2	1450	4/25	0	0.0	0.0	0.0	--
Butte Creek	18A3	4070	4/25	15	6.0	5.8	8.1	--
Cabin Creek	18A8	3170	4/25	9	3.0	0.0	2.7	--
Carmi	Canada	4100	4/29	5	2.0	0.6	5.0	--
Farron	Canada	4000	4/30	25	12.5	12.0	15.6	--
Goat Creek	18A4	3595	4/25	0	0.0	0.0	0.0	--
Lower Trapping Cr.	Canada	3050	4/29	0	0.0	0.0	0.0	--
#Monashee Pass	Canada	4500	5/4	24	8.7	18.1	17.1	13.7**
Old Glory Mountain	Canada	7000	4/27	84	39.8	--	46.3	28.9**
Snow Caps Creek	18A5	2150	4/25	0	0.0	0.0	0.0	--
Snow Caps Trail	18A6	2720	4/25	0	0.0	0.0	0.0	--
Summit G. S.	18A7	4600	4/25	19	7.4	5.5	9.0	6.3*
Upper Trapping Cr.	Canada	5500	4/29	9	3.8	6.1	9.4	--

SPOKANE RIVER

Copper Ridge	16B2	4800	5/1	60	29.8	15.3	34.0	27.8
Forty-nine Meadows	15B3	5000	5/3	40	20.8	21.7	32.4	30.6*
Fourth of July Summit	16B3	3100	5/1	0	0.0	0.0	--	--

Not located directly on this drainage

* Adjusted 1953-67 average

** Average for years of record



APPENDIX 2

SNOW

DRAINAGE BASIN and SNOW COURSE			1969			PAST RECORD		
Name	No.	Elev.	Date of Survey	Snow Depth (in.)	Water Content (in.)	Water Content (in.)		
						1968	1967	1953-67 Avg.

SPOKANE RIVER (Cont.)

Granite Peak	15B13A	6000	5/3	99	46.1	47.8	55.4	--
#Lookout	15B2	5250	4/16	88	42.9	31.0	41.9	--
			5/1	79	37.4	28.2	42.4	36.7
Lost Lake	15B14A	6000	5/3	148	73.0	56.4	65.8	62.7*
Lower Sands Creek	16B1	3400	5/2	42	18.7	8.2	16.6	14.6
Medicine Ridge	15B4A	6150	5/3	97	45.5	52.0	57.4	--
#Mosquito Ridge	16A4A	5110	Not Measured			--	--	39.2*
Outlaw Creek	15B12A	3750	5/3	0	0.0	3.0	13.2	8.0*

OKANOGAN RIVER

Aberdeen Lake	Canada	4300	4/30	0	0.0	2.5	4.8	--
Blackwall Mountain	Canada	6250	4/30	81	34.7	--	44.4	36.8**
Bouleau Creek	Canada	5000	4/29	24	9.1	11.6	--	7.2**
Brookmere	Canada	3200	4/28	10	3.5	6.8	9.0	5.6
Carrs Landing #1	Canada	2250	4/26	0	0.0	0.0	--	--
Carrs Landing #2	Canada	3200	4/26	0	0.0	0.0	--	--
Clark +	19A8a	7000	Not Measured			18.9	32.4	--
Enderby	Canada	6250	4/27	108	42.6	45.0	51.0	--
#Freezeout Meadows	20A2	5000	4/30	60	26.0	32.1	35.9	31.6
Hamilton Hill	Canada	4900	4/26	27	10.2	--	20.0	11.2**
#Harts Pass	20A5A	6500	5/2	110	49.0	55.1	56.5	49.8
Isintok Lake	Canada	5510	4/26	16	4.9	6.6	10.7	--
Lost Horse Mountain	Canada	6300	4/30	38	9.7	10.7	13.5	9.4**
McCulloch	Canada	4200	4/28	3	1.1	1.5	5.3	2.8
Missezula Mountain	Canada	5100	4/30	0	0.0	--	10.1	5.0**
Mission Creek	Canada	6000	4/29	57	21.1	23.6	26.1	21.5
Monashee Pass	Canada	4500	5/4	24	8.7	18.1	17.1	13.7**
Mount Kobau	Canada	5950	4/26	38	14.3	11.5	20.0	--
Mutton Creek No. 1	19A1	5700	4/25	26	11.2	7.2	20.0	10.0
Mutton Creek No. 2	19A4	6000	4/25	36	15.0	12.3	23.2	15.1
Nickel Plate Mtn.	Canada	6200	4/30	26	7.1	8.1	12.4	8.3**
Postill Lake	Canada	4500	4/30	16	5.9	7.8	8.6	6.6**
Rusty Creek	19A3	4000	4/25	0	0.0	0.0	2.8	1.3*
Salmon Meadows	19A2	4500	4/25	19	6.7	2.7	11.2	5.0*
Silver Star Mountain	Canada	6050	4/25	74	33.9	35.1	38.8	26.6**
Summerland Reservoir	Canada	4200	4/27	12	4.3	6.8	10.3	--
Trout Creek	Canada	4700	4/30	7e	3.4	3.3	7.3	4.2

Not located directly on this drainage

* Adjusted 1953-67 average

** Average for years of record

APPENDIX 3

SNOW

DRAINAGE BASIN and SNOW COURSE			1969			PAST RECORD		
Name	No.	Elev.	Date of Survey	Snow Depth (in.)	Water Content (in.)	Water Content (in.)		
						1968	1967	1953-67 Avg.

METHOW RIVER

Harts Pass	20A5A	6500	5/2	110	49.0	55.1	56.5	49.8
#Mutton Creek No. 1	19A1	5700	4/25	26	11.2	7.2	20.0	10.0
#Mutton Creek No. 2	19A4	6000	4/25	36	15.0	12.3	23.2	15.1
#Rusty Creek	19A3	4000	4/25	0	0.0	0.0	2.8	1.3*
#Salmon Meadows	19A2	4500	4/25	19	6.7	2.7	11.2	5.0

CHELAN LAKE BASIN

Rainy Pass	20A9	4780	5/2	96	42.6	42.7	52.8	43.9
Safety Harbor	20A30A	6300	4/30	80	35.9	32.6	32.4	--

ENTIAT RIVER

Brief	20B19	1600	4/24	0	0.0	0.0	0.0	--
Entiat Meadows +	20A33a	4800	4/15	102	45.4	42.6	44.5	--
			4/30	82	38.5	37.4	44.8	--
Entiat River Trail +	20A34a	3150	4/15	36	16.5	11.8	22.0	--
			4/30	18	8.8	5.4	12.5	--
Fox Camp +	20A36a	6510	4/15	140	63.3	62.3	58.9	--
			4/30	135	63.5	57.7	64.6	--
Pope Ridge	20B20	4300	4/10	41	18.6	7.3	14.1	--
			4/28	16	8.0	0.0	14.4	--
Pugh Ridge +	20A32a	6400	4/15	89	39.6	35.7	35.3	--
			4/30	85	40.0	31.3	45.2	--
Shady Pass	20A37	5000	4/11	78	34.9	29.4	--	--
			4/29	70	33.0	27.6	--	--
Snow. Brushy +	20A35a	3850	4/15	75	33.4	33.0	41.4	--
			4/30	55	25.9	28.8	34.5	--
Tommy Creek +	20B21a	5300	4/15	52	23.8	21.3	26.6	--
			4/30	44	20.7	14.6	31.9	--

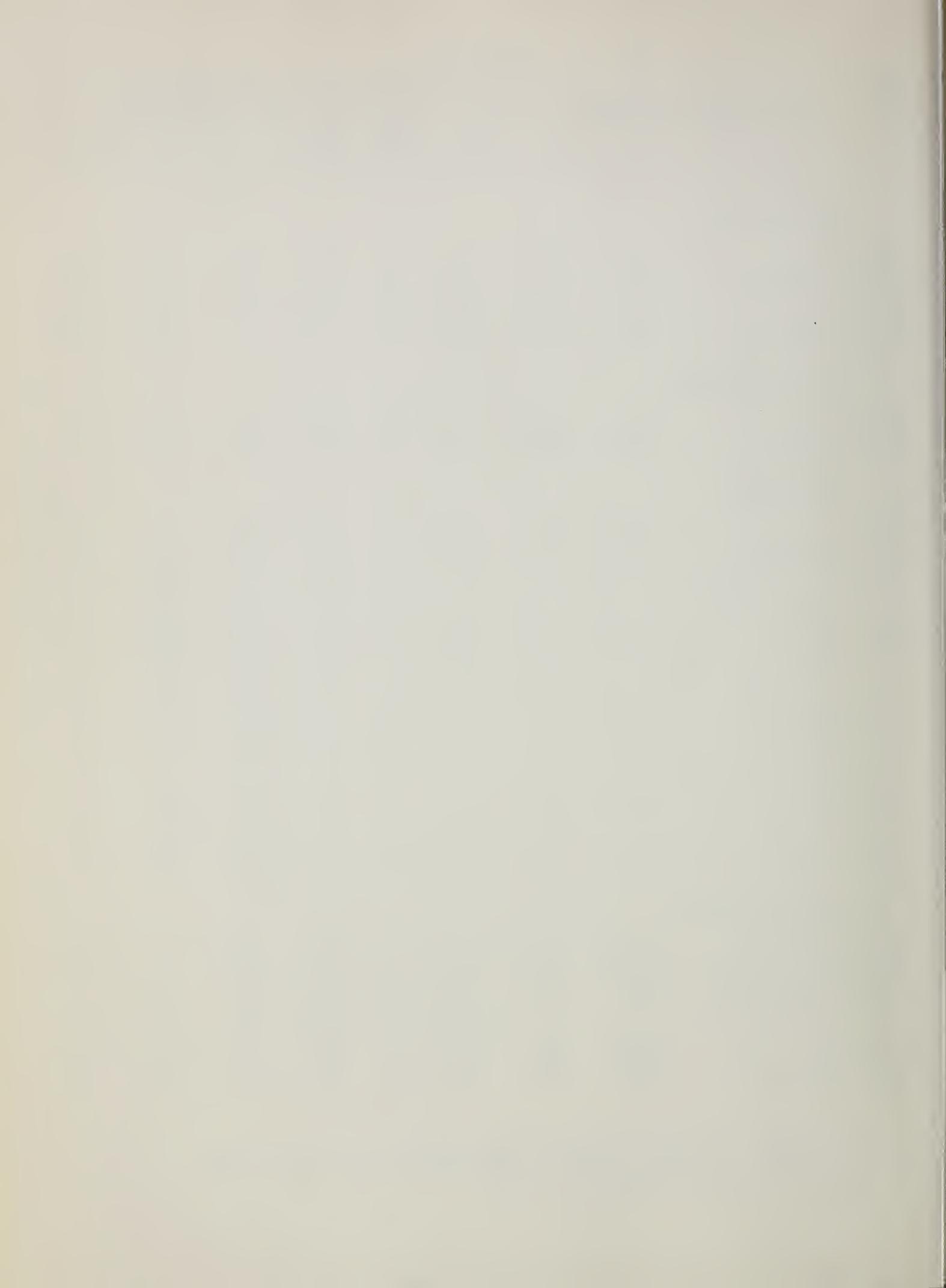
WENATCHEE RIVER

Berne-Mill Creek	21B23	2925	4/29	56	25.3	13.0	25.8	18.2*
Berne-Mill Creek New	21B41SP	3240	4/29	49	23.6	6.2	--	--
Blewett Pass No. 2	20B2	4270	4/16	36	18.7	5.0	9.8	--
			4/30	25	12.9	0.0	11.7	8.9
Chiwaukum G. S.	20B16	1810	4/29	5	2.2	0.0	0.0	--
#Fish Lake	21B4	3371	4/26	63	30.9	12.8	29.6	24.1*
Lake Wenatchee	20B5	1970	4/29	0	0.0	0.0	0.0	--

Not located directly on this drainage

+ Snow water equivalent estimated from aerial stadia observations

* Adjusted 1953-67 average



APPENDIX 4

SNOW

DRAINAGE BASIN and SNOW COURSE			1969			PAST RECORD		
Name	No.	Elev.	Date of Survey	Snow Depth (In.)	Water Content (In.)	1968	1967	1953-67 Avg.

WENATCHEE RIVER (Cont.)

Leavenworth R. S.	20B17	1127	4/14	0	0.0	--	0.0	--
Merritt	20B18	2140	4/29	9	4.4	0.0	0.0	--
Stevens Pass	21B1	4070	4/15	130	65.0	31.5	--	55.7*
			4/29	127	62.4	35.2	62.5	53.5
Stevens Pass Sand Shed	21B45	3700	4/15	84	40.5	--	--	--
			4/29	82	38.4	17.3	17.7	--

SQUILCHUCK CREEK

Beehive Springs	20B3	4400	4/28	8	3.5	0.0	3.8	--
Scout-A-Vista	20B4	3400	4/28	0	0.0	0.0	2.3	--

STEMILT CREEK

Jump-Off	20B8	4450	4/28	10	4.2	0.0	6.6	--
Stemilt Slide	20B6	5000	4/28	17	8.4	4.6	11.3	--
Upper Wheeler	20B7	4400	4/28	0	0.0	0.0	3.7	--

COLOCKUM CREEK

Colockum Creek	20B22	5300	4/29	27	13.7	6.2	--	--
Colockum Creek No. 2	20B23	4300	4/29	0	0.0	0.0	--	--

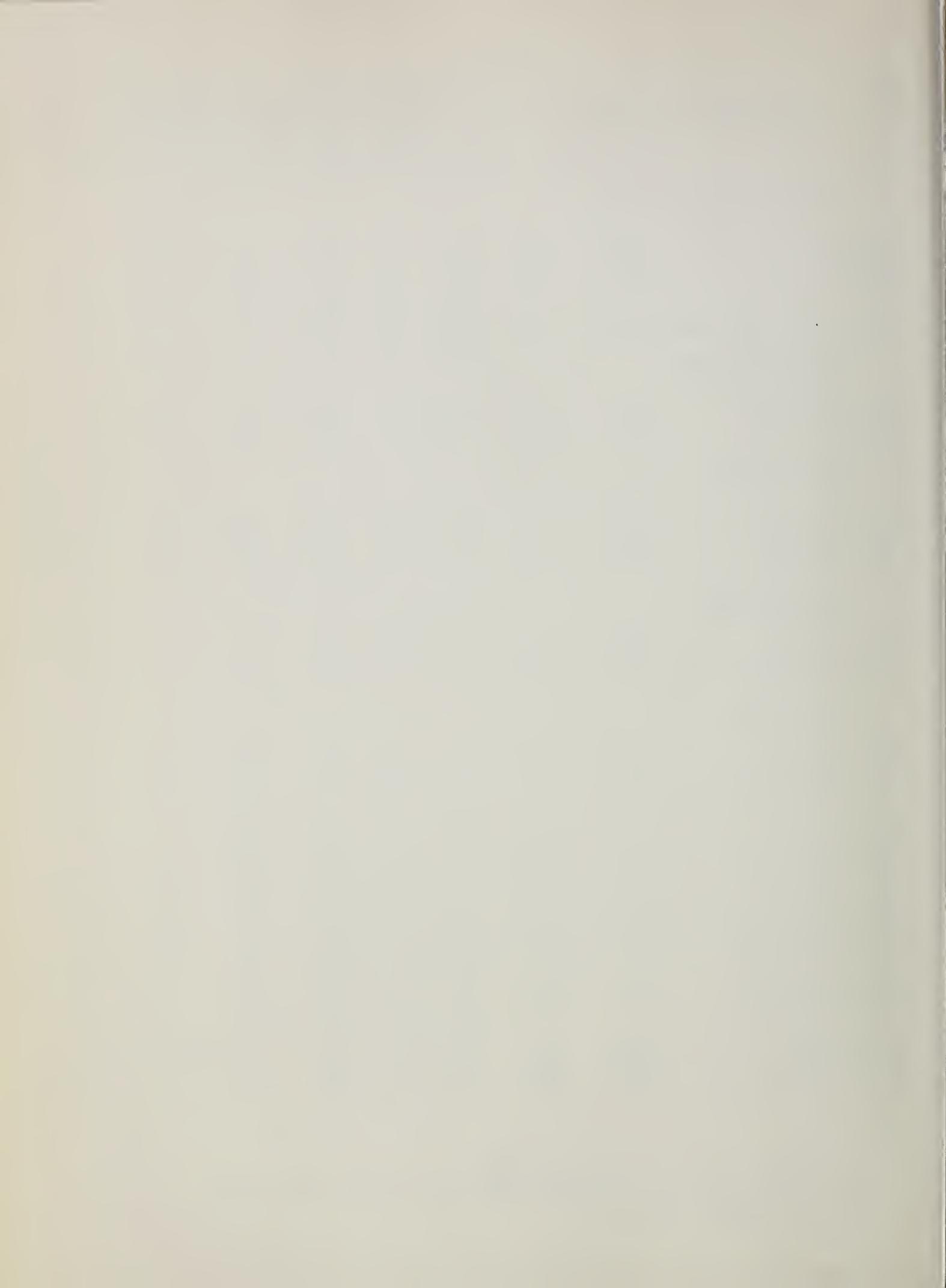
YAKIMA RIVER

#Ahtanum R. S.	21C11	3100	5/1	0	0.0	0.0	0.0	--
Big Boulder Creek	21B9	3200	4/26	26	11.7	0.0	5.6	5.0*
#Blewett Pass No. 2	20B2	4270	4/16	36	18.7	5.0	9.8	--
			4/30	25	12.9	0.0	11.7	8.9
Bumping Lake	21C8	3450	5/1	18	9.1	0.0	11.6	10.5
Bumping Lake New	21C36	3400	5/1	25	12.9	0.0	--	--
Fish Lake	21B4	3371	4/26	63	30.9	12.8	29.6	24.1*
Lake Cle Elum	21B14M	2200	5/1	0	0.0	0.0	0.0	--
Morse Lake	21C17	5400	4/29	138	66.3	47.8	83.2	62.4*
#Olallie Meadows	21B2	3625	4/15	99	50.0	20.1	52.0	--
			4/25	105	52.9	23.5	56.7	48.1
#Satus Pass	20D1	4030	4/29	6	2.5	0.0	0.0	--
#Stampede Pass	21B10	3000	4/14	108	50.3	22.0	--	--
			5/1	113	56.3	23.2	57.1	46.0
Lemah Creek +	21B47a	3327	4/25	60	28.2	New Aerial Marker		
Tunnel Avenue	21B8	2450	4/30	43	20.4	1.1	13.2	--
White Pass (E. Side)	21C28	4500	4/30	58	29.0	10.2	28.4	26.2*

Not located directly on this drainage

+ Snow water equivalent estimated from aerial stadia observation

* Adjusted 1953-67 average



APPENDIX 5

SNOW			1969			PAST RECORD		
DRAINAGE BASIN and SNOW COURSE			Date of Survey	Snow Depth (in.)	Water Content (in.)	Water Content (in.)		
Name	No.	Elev.				1968	1967	1953-67 Avg.

AHTANUM CREEK

Ahtanum R. S.	21C11	3100	5/1	0	0.0	0.0	0.0	0.0*
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LOWER COLUMBIA DRAINAGEASOTIN CREEK

Spruce Springs	17C4	5700	4/29	57	26.2	16.5	24.0	--
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MILL CREEK

Tollgate	18D3M	5070	4/29	30	13.8	0.0	9.9	17.5
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KLICKITAT RIVER

Satus Pass	20D1	4030	4/29	6	2.5	0.0	0.0	--
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WHITE SALMON RIVER

Cultus Creek	21C12	4000	4/26	114	57.4	31.5	59.3	47.8*
#Surprise Lakes	21C13A	4250	4/26	115	59.3	31.1	61.9	50.5

WIND RIVER

#Old Man Pass	21D19	3100	4/26	52	24.9	2.6	19.3	11.4*
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LEWIS RIVER

Blue Lake +	21C22a	4800	4/26	196	98.0	61.3	106.0	90.1*
Bob's Trail	21C21	2200	4/27	32	14.1	0.0	15.6	5.7*
Calamity Ridge +	22D1a	2500	4/26	10	4.6	0.0	0.0	--
Council Pass +	21C18a	4200	4/26	84	42.8	22.9	48.2	35.7*
#Cultus Creek	21C12	4000	4/26	114	57.4	31.5	59.3	47.8
Divide Meadow +	21C29a	5600	4/26	118	61.4	43.9	73.9	61.6*
Grand Meadow	21C25	3500	4/26	47	22.8	6.5	30.1	22.2*
Lone Pine Shelter	21C26	3800	Not Measured			32.3	56.8	45.3*
Marble Mountain +	22C5a	3200	4/26	88	48.4	3.5	39.5	--
New Muddy River	22C6	1400	4/27	3	1.1	0.0	0.0	--
Old Man Pass	21D19	3100	4/26	52	24.9	2.6	19.3	11.4*
Plains of Abraham +	22C1a	4400	4/26	188	94.0	51.7	92.0	73.8*
Smith Creek Road	22C4	2100	4/26	31	14.8	0.0	5.7	--
Spencer Meadow +	21C20a	3400	4/27	53	26.0	0.0	25.3	13.0*

Not located directly on this drainage

+ Snow water equivalent estimated from aerial stadia observation

* Adjusted 1953-67 average



APPENDIX 6

SNOW

DRAINAGE BASIN and SNOW COURSE			1969			PAST RECORD		
Name	No.	Elev.	Date of Survey	Snow Depth (in.)	Water Content (in.)	Water Content (in.)		
						1968	1967	1953-67 Avg.

LEWIS RIVER (Cont.)

Surprise Lakes	21C13A	4250	4/26	115	59.3	31.1	61.9	50.5*
Table Mountain +	21C24a	4200	4/26	95	48.4	29.9	56.9	44.7*
Timbered Peak +	21C18a	3000	4/26	38	19.0	0.0	21.4	12.3*

COWLITZ RIVER

#Plains of Abraham +	22C1a	4400	4/26	188	94.0	51.7	92.0	73.8
#White Pass (E. Side)	21C28	4500	4/30	58	29.0	10.2	28.4	26.2*

PUGET SOUND DRAINAGE

<u>WHITE RIVER</u>								
#Morse Lake	21C17	5400	4/29	138	66.3	47.8	83.2	62.4*

GREEN RIVER

Cougar Mountain SP	21B42SP	3200	4/25	41	18.6	3.2	28.8	--
Snowshoe Butte SP	21B43SP	5000	4/25	153	70.5	44.1	--	--
Stampede Pass	21B10	3000	4/14	108	50.3	22.0	--	--
			5/1	113	56.3	23.2	57.1	46.0

SNOQUALMIE RIVER

Olallie Meadows	21B2	3625	4/15	99	50.0	20.1	52.0	--
			4/25	105	52.9	23.5	56.7	48.1

SKYKOMISH RIVER

#Stevens Pass	21B1	4070	4/15	130	65.0	31.5	--	55.7*
			4/29	127	62.4	35.2	62.5	53.5
#Stevens Pass Sand Shed	21B45	3700	4/15	84	40.5	--	--	--
			4/29	82	38.4	17.3	17.7	--

SKAGIT RIVER

Beaver Creek Trail	21A4	2200	4/30	20	9.0	2.2	7.3	5.6*
Beaver Pass	21A1	3680	4/30	81	36.8	31.4	40.6	35.0
Devils Park	20A4	5900	5/2	101	44.6	51.6	57.4	49.2
Freezeout Cr Trail	20A1	3500	4/30	17	6.2	6.0	12.8	8.3

Not located directly on this drainage

+ Snow water equivalent estimated from aerial stadia observation

* Adjusted 1953-67 average

APPENDIX 7

SNOW

DRAINAGE BASIN and SNOW COURSE			1969		PAST RECORD			
Name	No.	Elev.	Date of Survey	Snow Depth (in.)	Water Content (in.)	1968	1967	1953-67 Avg.

SKAGIT RIVER (Cont.)

Freezeout Meadows	20A2	5000	4/30	60	26.0	32.1	35.9	31.6
#Harts Pass	20A5A	6500	5/2	110	49.0	55.1	56.5	49.8
Lake Hozomeen	21A2	2600	4/30	16	5.9	3.9	5.9	5.8
Meadow Cabins	20A8	1900	5/2	0	0.0	0.0	0.0	2.0*
#Rainy Pass	20A9	4780	5/2	96	42.6	42.7	52.8	43.9
Thunder Basin	20A7	4200	5/2	61	26.8	18.0	28.4	26.9*

BAKER RIVER

Dock Butte +	21A11A	3800	5/3	175	81.8	60.8	94.6	87.1*
Easy Pass	21A7A	5200	4/16	177	84.0	--	109.5	--
			5/3	190	88.3	85.0	110.2	107.4*
Jasper Pass	21A6A	5400	4/16	206	95.4	--	122.4	102.6*
			5/3	216	99.3	98.8	122.4	113.6*
Komo Kulshan	21A17	800	4/16	16	6.9	--	--	--
			5/3	0	0.0	0.0	0.0	--
Marten Lake +	21A9A	3600	4/16	180	82.8	--	102.8	92.3*
			5/3	190	89.2	64.7	100.2	93.3*
Mount Blum +	21A18a	5800	4/16	138	63.4	--	--	--
#Panorama New	21A5	4300	4/11	171	80.8	New Course		
			4/28	172	89.3			
Rocky Creek	21A12A	2100	4/16	80	36.9	--	41.8	31.8*
			5/2	70	33.7	18.4	39.8	20.4*
Schreibers Meadow	21A10A	3400	4/16	154	73.0	--	84.6	70.5*
			5/3	154	73.2	56.0	83.8	73.7*
S. F. Thunder Creek	21A14A	2200	5/3	0	0.0	0.0	0.0	--
Sulphur Creek	21A13	1600	4/16	36	16.7	--	13.4	--
			5/2	23	10.1	0.0	8.7	--
Three Mile Creek	21A8A	4500	5/3	0	0.0	0.0	0.0	--
Watson Lakes	21A8A	4500	4/16	170	76.4	--	89.8	79.7*
			5/3	181	84.8	63.5	90.7	83.6*

NOOKSACK RIVER

Panorama New	21A5	4300	4/11	171	80.8	New Course		
			4/28	172	89.3			

OLYMPIC PENINSULADUNGENESS RIVER

Deer Park	23B4	5200	4/28	58	27.3	19.1	33.8	24.3*
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Not located directly on this drainage

+ Snow water equivalent estimated from aerial stadia observation

* Adjusted 1953-67 average

APPENDIX 8

SNOW

DRAINAGE BASIN and SNOW COURSE			1969		PAST RECORD			
Name	No.	Elev.	Date of Survey	Snow Depth (in.)	Water Content (in.)	1968	1967	1953-67 Avg.

MORSE CREEK

Cox Valley	23B14	4500	4/26	115	56.1	35.9	--	--
Deer Park G. S.	23B13	4850	4/28	32	15.8	5.7	22.8	--

ELWHA RIVER

Hurricane	23B3	4500	4/27	82	35.4	20.8	38.4	--
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Agencies Assisting with Snow Surveys

GOVERNMENT AGENCIES

Canada:

Department of Lands, Forests and Water Resources,
Water Resources Service, British Columbia

States:

Washington State Department of Water Resources
Washington State Department of Natural Resources

Federal:

Department of the Army
Corps of Engineers
U. S. Department of Agriculture
Forest Service
U. S. Department of Commerce
Weather Bureau
U. S. Department of the Interior
Bonneville Power Administration
Bureau of Reclamation
Geological Survey
National Park Service

PUBLIC AND PRIVATE UTILITIES

Chelan County P.U.D.
Pacific Power and Light Company
Puget Sound Power and Light Company
Washington Water Power Company

OTHER PUBLIC AGENCIES

Okanogan Irrigation District
Wenatchee Heights Irrigation District

MUNICIPALITIES

City of Walla Walla
City of Tacoma
City of Seattle

Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.

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